WHAT IS CLAIMED IS:

1. In a decoder used for error detection of a codeword, a method for evaluating a single error location polynomial coefficient generated from said codeword in a cell corresponding to said single error location polynomial coefficient, said method comprising the acts of:

receiving an error location polynomial coefficient corresponding to said codeword;

multiplying said error location polynomial coefficient, on a first clock cycle corresponding to the processing of said codeword, by a Galois field multiplier having a negative exponent, wherein said negative exponent is a function of a stage number (j) corresponding to said cell and the length of said codeword (N), said act of multiplying resulting in a cell output; and

iteratively multiplying said cell output, for a subsequent N minus one clock cycles, by a Galois field multiplier having a positive exponent, wherein said positive exponent is a function of said stage number (j).

2. The method of claim 1 in which said cell is a Chien search cell of a Chien search block.

3. The method of claim 1 in which said cell is a Forney algorithm cell of a Forney algorithm block.

4. The method of claim 1 in which said cell is a Forney algorithm cell of a Chien/Forney block.

5. The method of claim 1 in which said decoder is a Reed-Solomon decoder.

6. In a decoder used for error detection of a codeword, a method for evaluating a single error location polynomial coefficient generated from said codeword in a cell corresponding to said single error location polynomial

coefficient, the operations of said method controlled by the parameters of the equations:

$$X_i = \sum_{j=0}^{t} \Lambda_j \alpha^{-j(N-1)} \qquad \text{for } i = 0$$

$$X_i = \sum_{j=0}^{t} \Lambda_j \alpha^{j} \qquad \text{for } i = 1, 2, \ldots, (N-1)$$

in which,

X_i is the i-*th* error location root,

t is one less than the total number of coefficients corresponding to an error location polynomial,

Λ_j is the j-*th* error polynomial coefficient,

N is the codeword length,

α is a Galois field element, and

j is a stage number corresponding to said single error location polynomial coefficient

7. An apparatus for evaluating a single error location polynomial coefficient generated from a codeword in a cell corresponding to said single error location polynomial coefficient, said apparatus incorporated within a decoder used for error detection of said codeword, said apparatus comprising:

means for receiving an error location polynomial coefficient corresponding to said codeword;

means for multiplying said error location polynomial coefficient, on a first clock cycle corresponding to the processing of said codeword, by a Galois field multiplier having a negative exponent, wherein said negative exponent is a function of a stage number (j) corresponding to said cell and the length of said codeword (N), said act of multiplying resulting in a cell output; and

means for iteratively multiplying said cell output, for a subsequent N minus one clock cycles, by a Galois field multiplier having a positive exponent, wherein said positive exponent is a function of said stage number (j).

8. The apparatus of claim 7 in which said cell is a Chien search cell of a Chien search block.

9. The apparatus of claim 7 in which said cell is a Forney algorithm cell of a Forney algorithm block.

10. The apparatus of claim 7 in which said cell is a Forney algorithm cell of a Chien/Forney block.

11. The apparatus of claim 7 in which said decoder is a Reed-Solomon decoder.